IN THE CLAIMS:

1. (Previously Presented) A system comprising:

a transceiver constructed to transmit an interrogating beam;

a communications station capable of receiving said interrogating beam; and

said communications station having a plurality of broad area intra-cavity phase conjugators arranged in an array.

2. (Original) The system of claim 1, further comprising:

said communication station capable of transmitting an encoded phase conjugate beam to said transceiver from said plurality of phase conjugators.

3. (Original) The system of claim 1, wherein said communication station is configured to respond to said interrogating beam by encoding data into a phase conjugate beam in a plurality of semiconductor laser diodes and pumping the encoded phase conjugate beam by intracavity nondegenerate four wave mixing.

4. (Original) The system of claim 3, wherein said encoding of said phase conjugate beam is accomplished at rates exceeding approximately 1 kiloHertz.

5. (Original) The system of claim 3, wherein said encoding of said phase conjugated beam is accomplished at rates in the range of approximately 1GHz to approximately 10 GHz.

6. (Original) The system of claim 1, wherein said plurality of phase conjugators are arranged in a substantially linear array.

7. (Original) The system of claim 1, wherein said plurality of phase conjugators are substantially spaced apart.

8. (Original) The system of claim 1, wherein said plurality of phase conjugators are single gain stripe devices.

9. (Original) The system of claim 1, wherein said plurality of phase conjugators number at least four.

10. (Original) The system of claim 1, wherein the plurality of intra-cavity phase conjugators each comprise an aperture sufficient to resolve a substantial portion of the spatial components of the input wavefront of the interrogating beam.

11. (Original) The system of claim 1, wherein the plurality of intra-cavity phase conjugators each comprise an aperture sufficient to resolve greater than approximately 80% of the spatial components of the input wavefront of the interrogating beam.

12. (Original) The system of claim 1, wherein the communication station does not have a movable part pointing and tracking system.

13. (Original) The system of claim 1, wherein the plurality of phase conjugators each have a top electrode with an aperture.

14. (Original) The system of claim 1, wherein the interrogating beam interacts with pump beams operating in the plurality of phase conjugators at a substantially transverse angle.

15. (Original) The system of claim 1, wherein the interrogating beam interacts with pump beams operating in the plurality of phase conjugators in a substantially parallel manner.

16. (Original) The system of claim 1, wherein the transceiver is mounted on one of the group consisting of a UAV, airplane, HALE, satellite, ground station, and an automobile.

17. (Original) The system of claim 1, wherein the communication station is mounted on one of the group consisting of a UAV, airplane, HALE, satellite, ground station, and an automobile.

18. (Previously Presented) A system comprising:

a transceiver constructed to transmit an interrogating beam; and

a communication station capable of receiving said interrogating beam; and

said communication station having a broad area, intra-cavity phase conjugator with a top electrode, wherein an aperture is located in said top electrode.

19. (Original) The system of claim 18, wherein the interrogating beam interacts with at least one pump beam operating in the phase conjugator at a substantially transverse angle.

20. (Original) The system of claim 18, wherein the phase conjugator is a broad–area, distributed feedback laser device.

21. (Original) The system of claim 18, wherein the aperture is greater than 10 microns.

22. (Previously Presented) A system comprising:

a transceiver constructed to transmit an interrogating beam;

a communication station capable of receiving said interrogating beam; and

said communication station having a broad area, intra-cavity phase conjugator which is a VCSEL structure.

23. (Original) The system of claim 22, wherein the interrogating beam interacts with at least one pump beam operating in the phase conjugator in a substantially parallel manner.

24. (Currently Amended) An optical interconnection system comprising:

a fiber optic device constructed to transmit an interrogating beam; and

a micro-mirror adapted to receive said interrogating beam and transmit the beam to a predetermined broad area intra-cavity VCSEL phase conjugator.

25. (Canceled)

26. (Original) The system of claim 24, wherein said interrogating beam interacts with at least one pump beams operating in the phase conjugator in a substantially parallel manner.

27. (Canceled)

28. (Currently Amended) An optical interconnection system comprising:

a fiber optic device constructed to transmit an interrogating beam; and

a micro-mirror adapted to receive said interrogating beam and transmit the beam to a predetermined broad area intra-cavity distributed feedback laser

phase conjugator. ~~The system of claim 24, wherein the phase conjugator is a broad-area, distributed feedback laser device.~~

29. (Currently Amended) The system of claim 28 ~~claim 24~~, wherein the interrogating beam interacts with at least one pump beam operating in the phase conjugator at a transverse angle.

30. (Currently Amended) The system of claim 28 ~~claim 24~~, wherein said predetermined phase conjugator is one of a plurality of phase conjugators arranged in an array.

31. (Currently Amended) The system of claim 28 ~~claim 24~~,wherein said predetermined phase conjugator is one of a plurality of phase conjugators arranged in a first array of a plurality of arrays of phase conjugators.

32. (Currently Amended) The system of claim 28 ~~claim 30~~, wherein the plurality of phase conjugators are single gain stripe devices.

33. (Currently Amended) The system of claim 28 ~~claim 30~~, wherein the plurality of phase conjugators have apertures located in a top electrode.

34. (Previously Presented) A system comprising:

a means for transmitting and receiving an interrogating beam;

a communication station operatively coupled to said transmitting and receiving means, wherein the station includes a broad area intracavity phase conjugator for returning a phase conjugate beam to said transmitting and receiving means.

35. (Previously Presented) A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at a communication station;

producing a phase conjugate beam of said interrogating beam by a broad area intracavity phase conjugator;

encoding data onto said phase conjugate beam and pumping an encoded phase conjugate reflectivity by nondegenerate four wave mixing; and

transmitting said encoded phase conjugate beam back to the transceiver.

36. (Previously Presented) A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at an array of phase conjugators;

producing a phase conjugate beam of said interrogating beam, wherein each of said phase conjugators arranged in said array comprise a broad area intracavity micro phase conjugator;

modulating data onto said phase conjugate beam; and

transmitting said phase conjugate beam to said transceiver.

37. (Original) The method of claim 36, further comprising:

collecting data through a sensor located in proximity to said phase conjugators and transmitting said data to said phase conjugators.

38. (Original) The method of claim 36, wherein said interrogating beam interacts with at least one pump beam operating in each of said phase conjugators in a substantially parallel manner.

39. (Original) The method of claim 36, wherein said interrogating beam interacts with at least one pump beam operating in each of said phase conjugators in a substantially transverse manner.

40. (Previously Presented) A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at an array of broad area intra-cavity phase conjugators through apertures located in the top electrodes of the phase conjugators;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to said transceiver.

41. (Previously Presented) A method comprising:

transmitting an interrogating beam from a transceiver;

receiving said interrogating beam at an array of broad area intra-cavity phase conjugators and resolving a substantial portion of the spatial components of the input wavefront of the interrogating beam;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to said transceiver.

42. (Canceled)

43. (Canceled)

44. (Canceled)

45. (Original) The system of claim 1, wherein said plurality of intra-cavity phase conjugators are arranged in a two dimensional array.

46. (Original) The system of claim 1, wherein said plurality of intra-cavity phase conjugators includes:

a non-linear medium for each of said plurality of intra-cavity phase conjugators wherein said non-linear medium is adapted to produce at least two coherent pump beams; and

a means to encode said coherent pump beams.

47. (Original) The system of claim 46, wherein said nonlinear medium is a diode structure comprising a broad-area distributed feedback laser device.

48. (Original) The system of claim 18, wherein said intra-cavity phase conjugator with said top electrode includes:

a nonlinear medium adapted to produce at least two coherent pump beams; and

a means to encode said coherent pump beams.

49. (Original) The system of claim 48, wherein said nonlinear medium is a diode structure comprising a modified broad-area distributed feedback laser device.